

In re Patent Application of:

CATTANEO ET AL

Serial No. **10/792,032**

Filed: **March 3, 2004**

REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application. Applicants would also like to thank the Examiner for correctly indicating as allowable the subject matter of dependent Claims 26-32, 38-44 and 50-56. Dependent Claims 29 and 38-40 have been amended to correct noted inconsistencies. The arguments supporting patentability of the claims are provided below.

I. The Claimed Invention

The present invention, as recited in independent Claim 1, for example, is directed to a method for processing an incident pulsed signal of an ultra wide band type received over a channel by a data device operating in a wireless data communications system. The incident pulsed signal carries information within a super-frame structure. Each super-frame structure comprises a plurality of frames respectively allocated for communications between specific pairs of data devices operating in the wireless data communications system and a header including at least one first training sequence. Each frame comprises a preamble including at least one second training sequence.

The method comprises upon reception of each super-frame structure by a data device, performing coarse synchronization with another data device acting as a coordinator device for the wireless data communications system. The coarse synchronization uses the first training sequence. Upon reception of each frame

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allocated to the data device operating within the super-frame structure, the method further comprises performing channel estimation using the second training sequence. The channel estimation is based on at least one signal slice having ends temporally defined with respect to a result of the coarse synchronization, and the channel estimation also performs a frame synchronization.

Independent Claim 37 is directed to a data device for a wireless data communications system, and is similar to independent Claim 25.

Independent Claim 49 is directed to a wireless data communications system, and is similar to independent Claim 25.

II. The Independent Claims Overcome the 35 USC §112 Rejections

The Examiner rejected independent Claims 25, 37 and 49 as failing to comply with the written enablement requirement. In particular, the Examiner has taken the position that the claim recitation of "the channel estimation being based on at least one signal slice having ends temporally defined with respect to a result of the coarse synchronization" is not supported by the specification.

Reference is directed to paragraph 50, which provides "However, to recover all the channel energy, and thereby perform a fine frame synchronization, the ends of the signal slices have to be properly defined." To perform a fine frame synchronization, coarse synchronization is first performed. In the very next paragraph (i.e., paragraph 51), coarse synchronization is discussed. Paragraph 51 provides that "coarse synchronization

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performed at the beginning of the super-frame structure provides the first delay information T_s . This first delay information T_s together with the time of arrival indication TOA_i of the frame FR_i gives a first information about this frame synchronization."

As recited in the independent claims, the coarse synchronization in the claimed invention uses the first training sequence. The independent claims further recite that channel estimation is performed using a second training sequence. The channel estimation is based on at least one signal slice having ends temporally defined with respect to a result of the coarse synchronization. The channel estimation also performs a frame synchronization. The Applicants thus submit that the specification describes the claim recitation "the channel estimation being based on at least one signal slice having ends temporally defined with respect to a result of the coarse synchronization."

The Examiner further rejected independent Claims 25, 37 and 49 based on the recitation "with respect to a result of the coarse synchronization." The Examiner states that the claims nor the specification describe the results of a coarse synchronization. The Applicants submit that the specification discloses a coarse synchronization and a fine synchronization being performed, with the respective synchronizations corresponding to first and second training sequences. Paragraph 51 states that "the coarse synchronization performed at the beginning of the super-frame structure provides the first delay information T_s ." As noted above, paragraph 51 further provides "this first delay information T_s together with the time of

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arrival indication TOA_i of the frame FR_i gives a first information about this frame synchronization." The Applicants thus submit that the specification describes the result of a coarse synchronization as recited in the claimed invention.

III. The Claims Are Patentable

The Examiner rejected independent Claims 25, 37 and 49 over the Mody et al. patent in view of the Ma et al. patent in further view of the Santhoff et al. patent. The Examiner has characterized Mody et al. as disclosing the claimed invention except for 1) the channel estimation also performing a frame synchronization, and 2) the transmission signal comprising an incident pulsed signal of an ultra wide band (UWB) type. The Examiner cited Ma et al. as disclosing features 1) and 2). The Examiner cited Santhoff et al. as disclosing UWB devices.

The Applicants submit that even if the references were selectively combined as suggested by the Examiner, the claimed invention is still not produced. Mody et al. and Ma et al. are both directed to a MIMO system. As illustrated in FIG. 1 of Mody et al., for example, a transmitter **8** transmits signals across the wireless channel **19** and a receiver **10** receives the transmitted signals. The Examiner characterized the receiver **10** as performing a coarse synchronization with another data device acting as a coordinator device.

As illustrated in FIG. 1 of Mody et al., a transmitter **8** transmits signals across the wireless channel **19**, and a receiver **10** receives the transmitted signals. Since Mody et al.

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is directed to MIMO systems instead of UWB systems, there is no need to perform a coarse synchronization with another data device acting as a coordinator device of the wireless data communications system. Instead, the transmitter **8** and receiver **10** communicate directly with one another.

In addition, selectively combining the prior art references as suggested by the Examiner fails to produce coarse synchronization using a first training sequence and a channel estimation using a second training sequence, with the channel estimation being based on at least one signal slice having ends temporally defined with respect to a result of the coarse synchronization.

As best illustrated in FIG. 4 of Mody et al., the preambles **54** of the illustrated frames **52** each includes a training sequence N_1 . The N in the data portion **56** of the frame **52** corresponds to the OFDM data symbols. The Applicants submit that Mody et al. fails to disclose a second training sequence. Instead, Mody et al. discloses a single training sequence N_1 . In the claimed invention, each super-frame structure comprises a plurality of frames and a header including at least one first training sequence, with each frame comprising a preamble including at least one second training sequence.

The Examiner referenced block **701** in FIG. 7 in Ma et al. as disclosing channel estimation also performing a frame synchronization. Block **701** converts the analog OFDM signals into digital signals and uses the preamble of the signal to synchronize the signal and determine the frame boundaries of the

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transmitted data. Ma et al. discloses fine synchronization being performed by checking the correlation between received signals with known signals that are stored in the OFDM receiver memory. Ma et al. fails to disclose that the fine synchronization is performed based on the results of a first or coarse synchronization as in the claimed invention. The Applicants thus submit that Ma et al. fails to provide the noted deficiency of Mody et al.

In Santhoff et al., which is directed to UWB devices, discloses in column 7, lines 60-64 that device **60(d)** illustrated in FIG. 4 is a master transceiver that manages communications on the network. However, Santhoff et al. also fails to provide the noted deficiencies of Mody et al. and Ma et al.

Accordingly, it is submitted that independent Claim 25 is patentable over the Mody et al. patent in view of the Ma et al. patent in further view of the Santhoff et al. patent. Independent Claims 37 and 49 are similar to independent Claim 25. Therefore, it is submitted that independent Claims 37 and 49 are patentable over the Mody et al. patent in view of the Ma et al. patent in further view of the Santhoff et al. patent.

In view of the patentability of independent Claims 25, 37 and 49, it is submitted that the dependent claims, which include yet further distinguishing features of the invention are also patentable. These dependent claims need no further discussion herein.

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IV. CONCLUSION

In view of the claim amendments and arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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